

World Record CEP-Noise

Since its first demonstration the frequency comb has evolved into a versatile optical tool. Today, TOPTICA's Difference Frequency Comb DFC enables applications like high resolution spectroscopy, optical clocks or low-noise microwave generation.

20 years ago, John L. Hall (Nobel laureate together with Theodor Hänsch "for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique") and coworkers published a seminal paper¹, in which they first reported on the stabilization of the carrier-envelope phase of the pulses of a femtosecond mode-locked laser. With the Difference Frequency Comb DFC, TOPTICA has taken the next step. Using difference-frequency generation (DFG), the carrier-envelope phase is now stabilized for each pulse individually with an intrinsic locking bandwidth identical to the repetition rate of 200 MHz. The result is an unprecedented low level of carrier-envelope phase noise of only 135 mrad integrated from 70 mHz to 40 MHz. The DFG process is key for achieving such high-end performance. It also delivers a new level of robustness, which allows for reliable long-term operation. Moreover, the DFC product line offers a very user-friendly control interface and comes in a compact 19-inch format. The unique combination of these properties turn it into the ideal source for the most demanding comb applications no matter if you are a comb expert or if you are discovering the field.

¹ Jones et al., Science 288, pp. 635-639 (28 Apr 2000)

For more information visit the TOPTICA [Difference Frequency Comb webpage](#)



DFC CORE +

Compact, robust, high-end and convenient.

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TOPTICA has been developing and manufacturing high-end laser systems for scientific and industrial applications for 20 years. Our portfolio includes diode lasers, ultrafast fiber lasers, terahertz systems and frequency combs. The systems are used for demanding applications in biophotonics, industrial metrology and quantum technology. TOPTICA is renowned for providing the widest wavelength coverage of diode lasers on the market, providing high-power lasers even at exotic wavelengths. Today, TOPTICA employs 320 people worldwide in six business units (TOPTICA Photonics AG, TOPTICA eagleyard, TOPTICA Projects GmbH, TOPTICA Photonics Inc. USA, TOPTICA Photonics K.K. Japan, and TOPTICA Photonics China) with a consolidated group turnover of € 74 million.